JPRS 74516

5 November 1979

USSR Report

GEOPHYSICS, ASTRONOMY AND SPACE

No. 456

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50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. JPRS 74516	2.	3. Recipient's Accession No.
4. Title and Subtitle USSR REPORT: GEOPHYSICS, ASTRONOMY AND SPACE, No. 456			5. Report Date 5 November 1979 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address As above			13. Type of Report & Period Covered 14.
15. Supplementary Notes			

16. Abstract (Limit: 200 words)

This serial report contains articles, abstracts and news items on meteorology, oceanography, upper atmosphere and space research, astronomy and terrestrial physics, covering both science news and formal scientific reports. Published details of Soviet space spectaculars are included.

17. Document Analysis a. Descriptors

USSR
Geophysics
Astronomy
Astronautics
Meteorology
Oceanography

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group 3, 4A, 4B, 8, 22

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Unlimited Availability Sold by NTIS Springfield, Virginia 22161	UNCLASSIFIED	16
	20. Security Class (This Page) UNCLASSIFIED	22. Price

JPRS 74516

5 November 1979

USSR REPORT

GEOPHYSICS, ASTRONOMY AND SPACE

No. 456

This serial publication contains articles, abstracts of articles and news items from USSR scientific and technical journals on the specific subjects reflected in the table of contents.

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STUDY OF BEHAVIOR OF STEEP WAVES OF STOKES-MICHELL TYPE

Moscow IZVESTIYA AKADEMII NAUK SSSR, FIZIKA ATMOSFERY I OKEANA in Russian
Vol 15, No 8, 1979 pp 829-835

[Article by V. V. Shuleykin, Marine Hydrophysical Institute Ukrainian Academy of Sciences, "Results of Experiments With the Steepest Possible Waves of the Stokes-Michell Type"]

[Abstract] The experiments were carried out using improved apparatus in the storm basin at the Marine Hydrophysical Institute Ukrainian Academy of Sciences (Katsiveli). It was experimentally demonstrated that there is a constancy of the angular velocity of rotational motion of water particles in a wave. The velocity of translational motion -- a Stokes wave current -- was constant, contrary to the initial hypothesis. Theoretical curves were constructed which represent the trajectories of two particles: lying on a calm water surface and underneath it at a depth of 1/4 the wave height. In this scheme there is satisfaction of the condition of continuity of the flow within the corresponding streamline tube. With a constant velocity of the wave current the well-known method of construction of the profile of waves gave a curve which only insignificantly differs from a trochoid and has nothing in common with the sharp-peaked Stokes-Michell wave. It is demonstrated that such a profile can be obtained only in the presence of pulsation of the total velocity of the waves -- phase velocity + velocity of the wave current. Conclusion: the phase velocity of the steepest possible waves (and steep waves in general) is dependent on the phase: it is maximum at the foot of the waves and is minimum at the peak. The author gives an explanation of this phenomenon: it is caused by the requirement of a constancy of hydrostatic pressure on horizontal surfaces in the case of an inequality of the radii of the curvature of particle trajectories — near the peaks the radius is three times greater than near the foot of the waves. Precisely pulsation of the resultant velocity of the waves led to an excellent coincidence between computations using the old scheme and the real parameters of steep waves.
[18-5303]

TWO-PARAMETER MODEL OF STATIONARY THERMOCLINE IN THE OCEAN

Moscow IZVESTIYA AKADEMII NAUK SSSR, FIZIKA ATMOSFERY I OKEANA in Russian
Vol 15, No 8, 1979 pp 837-845

[Article by A. V. Frolov, USSR Hydrometeorological Center, "Two-Parameter Model of the Stationary Thermocline in the Ocean"]

[Abstract] The author examines the problem of the stationary structure and circulation of waters in a rectangular basin outside the boundary layers. The motion of the fluid is caused by nonuniformity of the temperature field at the surface and the wind effect. The structure of the thermocline is described using a density model, whose two unknown parameters are determined from the problem itself. An analysis of the determined solution indicates that for the conditions of a subtropical circulation in the North Atlantic it gives two qualitatively different types of density profiles (with and without an inflection point). At the same time there is a considerable refinement of the quantitative characteristics of the vertical distribution of density and currents obtained using an exponential single-parameter model.
[18-5303]

PARAMETERIZATION OF SPECTRA OF SHORT-PERIOD TEMPERATURE FLUCTUATIONS

Moscow IZVESTIYA AKADEMII NAUK SSSR, FIZIKA ATMOSFERY I OKEANA in Russian
Vol 15, No 8, 1979 pp 846-854

[Article by G. N. Khristoforov and A. S. Zapevalov, Marine Hydrophysical Institute, Ukrainian Academy of Sciences, "Parameterization of Spectra of Short-Period Temperature Fluctuations Measured in the Wind Waves Layer"]

[Abstract] A study was made of the characteristic frequency scales of rise of the surface $\eta(t)$ and temperature fluctuations T(t) in the upper layer of the sea and also the correlation between them. It is shown that a linear interaction between η and T occurs in a narrow frequency band near the central frequency of the spectrum of surface rise. A parameterization of the spectra of "wave" $S_T^{wave}(f)$ and "incoherent" $S_T^{in}(f)$ components of the temperature fluctuations is proposed. It is shown that the correlation between $S_T^{wave}(f)$ and $S_T^{in}(f)$ is determined by the following quadratic integral parameters: Cox number C^2, scale number of the microstructure D^2 and the scale turbulence number M_T^2.
[18-5303]

II. TERRESTRIAL GEOPHYSICS

Abstracts of Scientific Articles

VARIATIONS OF ACTIVITY OF CRUSTAL EARTHQUAKES IN DIFFERENT DEPTH LAYERS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 247, No 5, 1979 pp 1100-1102

[Article by I. L. Nersesov, V. S. Ponomarev and Yu. M. Teytel'baum, Institute of Physics of the Earth, "Variations in the Activity of Crustal Earthquakes in Different Depth Layers and Seismic Prediction"]

[Abstract] Earthquakes in the Garm region are associated for the most part with the upper part of the earth's crust and their number decreases rapidly with an increase in depth. For example, in the layer 0-5 km there were 50% of the total number, in the layer 6-10 km -- 35%, and in the layer 11-15 km -- 8%. Very few events are recorded deeper than 30 km. An analysis of the long- and short-term components of changes in the activity of weak earthquakes at different depths leads to the conclusion that these changes at a depth greater than 10 km are associated with factors exerting an influence on the appearance of strong earthquakes, whereas the temporal variation of change in activity of less deep earthquakes is subject to a greater degree to the influence of local processes evidently associated with the greater nonuniformity of the geological structure of the medium with approach to the surface. An examination of the data shows that in most cases with the appearance of relatively strong earthquakes with M = 5-5.5 in this region during the period of their preparation there is an increase in seismic activity at great depths with a subsequent "floating up" of the foci. This peculiarity of the seismic process can be used as a prediction criterion in detailed seismic observations in zones of anticipated seismic tremors. [11-5303]

STRUCTURE AND PETROLEUM AND GAS DEPOSITS IN CASPIAN DEPRESSION

Moscow BYULLETEN' MOSKOVSKOGO OBSHCHESTVA ISPYTATELEY PRIRODY, OTDEL GEOLOGICHESKIY in Russian Vol 54, No 4, 1979 pp 49-53

[Article by V. M. Brenner, Z. V. Golubeva and G. M. Yermolayeva, "Structure and Petroleum and Gas Resources of the Paleozoic Subsalt of the Southeastern Caspian Depression According to Seismic Data"]

[Abstract] The structure of the southeastern part of the Caspian depression and the nature of its joining to the Ural-Emba folded zone have caused many discussions. This problem is now acquiring particular timeliness in connection with the established commercial petroleum and gas resources of the pre-Kungurian rocks both directly in the particular region (borehole 1, Tortay) and in similar structural zones in the eastern part of the Caspian depression. In the Paleozoic complex of the considered region there are for the most part three zones which differ from one another with respect to the characteristics of the wave field and structural-formation parameters: South Emba folded zone, South Emba Paleozoic uplift and southeastern marginal zone of the Caspian depression, corresponding to a pericraton downwarp. The South Emba Paleozoic uplift, situated in the zone of joining of the marginal part of the platform and the South Emba folded zone, is a complex sedimentation-tectonic structure. In petroleum geology regionalization this element must be considered as a structural-formation barrier, occupying a "watershed" position in a system of depressions of different types and different ages, extremely favorable for the formation of concentrations of hydrocarbons. The prospects for the discovery of commercial deposits of petroleum and gas can be associated with sectors where there is a facies replacement of terrigenous rocks by calcareous rocks. It is probably precisely under these conditions that a petroleum deposit was discovered in the Tortay area. The calcareous deposits of the Carbonaceous can also be regarded as promising since they have a great thickness and are characterized by the development of fissured collectors.
[12-5303]

SEISMIC ACTIVITY OF DEEP FAULTS IN ARMENIA

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR, NAUKI O ZEMLE in Russian Vol 32, No 2, 1979 pp 29-36

[Article by S. N. Nazaretyan, Institute of Geophysics and Engineering Seismology Armenian Academy of Sciences, "Seismic Activity of Deep Faults in the Territory of the Armenian SSR Detected Using Geophysical Data"]

[Abstract] The seismotectonics of Armenia is closely tied in to the study of deep faults, with whose activity is related the appearance of strong earthquakes. It has been confirmed that most of the strong earthquakes are

associated with deep fault zones. Figure 1 is a schematic seismotectonic map of the territory of the Armenian SSR; Fig. 2 shows the relationship between earthquake epicenters and zones of deep faults; Fig. 3 is a map of epicenters with $M \geq 4$ and a diagram of the location of deep faults. It is shown that the overwhelming majority of the epicenters are associated with zones of deep faults. This correlation is stronger for epicenters of earthquakes of class 6-8. It was found that the northwestern and central segments of the deep faults, in comparison with the southeastern segment, are more highly seismic. Whereas earthquakes of class 7-8 are associated with the northwestern and central segments of the Yerevan fault, earthquakes of class 5-6 are associated with the southeastern segment. An important pattern of seismicity of the Anticaucasus is that the most seismically active sectors coincide with tectonic "nodes" -- regions of intersection of faults with different strikes The Zangezurskiy, Leninakanskiy, Araratskiy and Digorskiy seismogenic nodes have been relatively seismically active in the 20th century. These should serve as objects (polygons) for carrying out seismic research work on the problem of earthquake prediction. Such patterns and the defined seismically active regions make it possible to break down the territory of Armenia into two regions which differ from one another with respect to maximum intensity and the frequency of earthquakes. In the first region one should expect earthquakes with an intensity up to 8. The most probable regions of occurrence of strong earthquakes is certain segments of deep faults and the regions of their intersection. In the second region one can expect earthquakes with an intensity up to 7.
[14-5303]

SEISMOGENIC ZONES IN THE TERRITORY OF WESTERN KAZAKHSTAN

Tashkent UZBEKSKIY GEOLOGICHESKIY ZHURNAL in Russian No 3, 1979 pp 11-15

[Article by R. N. Ibragimov, Institute of Seismology Uzbek Academy of Sciences, "Defining of Seismogenic Zones in the Territory of Western Uzbekistan"]

[Abstract] In the seismic regionalization of Uzbekistan it was found that the principal seismogenerating structures are zones of regional faults and flexural dislocations separating regions of uplifts and downwarps and folded-block structures with different histories of geological development associated with them. In western Uzbekistan the defining of seismogenic zones requires determination of the degree of their seismogenic development. This has now been determined on the basis of qualitative criteria without taking quantitative parameters of seismicity into account. However, allowance was made for the dependence between the parameters of earthquake foci, length of dislocations, intensity of recent and present-day movements and their gradients, and also gravity gradients, etc. The magnitude of individual zones was determined on the basis of known earthquakes or a comparison of the parameters with already known zones, that is, by the analogy method.

The paper gives detailed information on the Bukharskaya, Amudar'inskaya, Baysunskaya, Samarkandskaya, Bakhmal-Kul'dzhuktauskaya and Dzhizak-Muruntauskaya seismogenic zones. A figure in the text shows a map of the seismogenic zones of western Uzbekistan.
[13-5303]

DENSITY OF FAULTS IN RELATION TO EPICENTERS IN UZBEKISTAN

Tashkent UZBEKSKIY GEOLOGICHESKIY ZHURNAL in Russian No 3, 1979 pp 16-20

[Article by D. Kh. Yakubov and A. R. Yarmukhamedov, Seismology Institute Uzbek Academy of Sciences, "Distribution of Density of Faults and Their Relationship to Epicenters of Strong Earthquakes in Eastern Uzbekistan"]

[Abstract] The authors have compared the epicenters of strong earthquakes with the nature of distribution of the density of dislocations. A map was compiled showing the density of faults for the territory of eastern Uzbekistan bounded by the coordinates 39°20-42°00 N, 68°30-74°00 E. The initial material for compiling the map of faults and the map of density of faults was all the known faults established by geological, geomorphological surveys, geomorphological investigations, and also interpretation of aerospace surveys. By "density of dislocations" is meant the number (in running meters or kilometers) of dislocations per 1 km^2 of area. The faults were plotted in rectangles with an area of 1575 km^2. The computations were made in 375 sectors. Earthquake epicenters for the period 838-1976 were also plotted. It was found that the areal distribution of individual energy classes is different in dependence on fault density. Areas with the following densities were defined: 0-50, 50-100, 100-150, 150-200, 200-250, 250 m/km^2 or more. An analysis of the schematic map of the density of dislocations (Fig. 1 in the text) and the graphs of the distribution of epicenters (Fig. 2) revealed that with a decrease in the frequency of occurrence of earthquakes with K = 9, 10, 11, 12, 14 there is an increase in the density of dislocations. The epicenters of earthquakes with K = 14, 15 for the most part are associated with sectors where the density is 50-160 m/km^2. Thus, a comparison of earthquake epicenters for different energy classes does not always reveal a clear correlation. But for a real comparison of the correlation between earthquakes and dislocations it is necessary to have a specialized map of densities for the Neogene and the present-day stage, taking morphological and kinematic characteristics into account.
[13-5303]

III. UPPER ATMOSPHERE AND SPACE RESEARCH

Abstracts of Scientific Articles

USE OF SPACE PHOTOS IN IDENTIFYING HYDROGEOLOGICAL CONDITIONS

Leningrad IZVESTIYA VSESOYUZNOGO GEOGRAFICHESKOGO OBSHCHESTVA in Russian
Vol 111, No 4, 1979 pp 306-310

[Article by A. L. Revzon, "Some New Tendencies in Landscape Indication of Hydrogeological and Geological Engineering Conditions in Relation to Use of Materials from a Space Photographic Survey"]

[Abstract] Depending on the level of generalization of materials from a space photographic survey, the objects of landscape-indication mapping are natural complexes of different rank, each of which is characterized by a certain structure. On global photographs the structure of the photographic image is determined by the endomorphogenic relationships of the landscape components, on regional photographs -- the exomorphogenic relationships, and on local photographs -- the exomorphobiogenic relationships, and finally, on detailed photographs -- the bioexomorphogenic characteristics. Accordingly there is a change in the volume of the hydrogeological and engineering geology information reflected on landscape-indication maps. The use of space photographs in landscape-indication investigations frequently rests on elements of the tectonic structure which play an indication role. This circumstance makes it possible to examine the structural-tectonic conditions as a landscape component, at some levels of indication mapping playing the role of an indicator and at others, the role of an indicant.
[15-5303]

Translations

NOTES ON THE MKF-6M SPACESHIP CAMERA

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 8, 1979 pp 40-41

[Article by A. Yurin, "In the Window of the MKF-6M"]

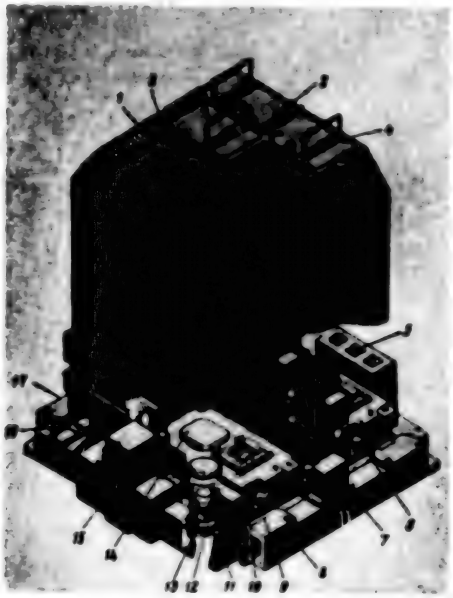
[Text] The MKF-6M multizonal camera, installed aboard the "Salyut-6" orbital scientific station, is a block of six synchronously operating cameras. This is a complex optical-mechanical and electronic instrument. It contains 4,000 mechanical parts, 50 electronic printed circuit boards and 150 microelectronic circuits. The MKF-6M complex includes: camera, electronic components, two control panels (one reserve), and magazines. The total mass of the instrument is 173 kg.

The camera has six objectives with a focal length of 125 mm and six magazines with films on which one and the same terrain sector has been photographed synchronously. In four magazines use is made of film of the isopanchromatic type and in two, film which is sensitive in the near-IR range -- IK-780, IK-840. The film width is 70 mm. The terrain photograph measures 81 x 56 mm.

The light filters are supplied with objectives, each of which transmits radiation only in a narrow part of the spectrum. Light in the visible spectral range passes through four objectives and through two -- light in the near-IR. Thus, in a terrain survey it is possible to obtain simultaneously six black-and-white images corresponding to the six spectral zones. The ranges selected taking into account the interests of different branches of the national economy make it possible to study the surface of the land, ocean, ice cover, and also carry out precise investigations of the earth's atmosphere and cloud formations.

Each photograph covers a sector of the terrain with an area of about 20,000 km^2 and has rich photogrammetric and photometric information, that is, information on the linear dimensions of objects and their brightness. On the photographs it is possible to determine features with linear dimensions of 10-20 m and a brightness differing by several percent.

The mechanism for winding the film and its smoothing is in the magazine. Each magazine holds film with a length of 220 m with a thickness of 0.09 mm and 110 m in the case of a thickness of 0.18 mm. This ensures a survey of 2,400 and 1,200 frames respectively.



Multizonal space camera, the MKF-6M: 1) magazines; 2) frame counter; 3) bolt for holding magazine in camera; 4) number of magazine; 5) plugs for electrical connection; 6) mirror for checking imprinting of additional information; 7) axis of rotation of camera; 8) supporting frame; 9) lever for setting diaphragms; 10) frame for imprinting additional information; 11) light filter; 12) shutter disk; 13) objective; 14) smoothing glass; 15) mechanism for compensating image shift; 16) clock; 17) camera block.

One loading is adequate for a survey of almost 20 million square kilometers of terrain. The cosmonauts reload magazines. The film is delivered to the station by transport and freight ships.

In order to be able to construct general photoplans from the photographs provision is made for their mutual overlapping. If it exceeds 60%, such photographs form a stereopair. In the camera there is provision for a survey with an overlap of 20, 60 and 80%. The desired overlap is set on the control panel.

The survey interval is set by the electronics block. It also ensures interaction of all the mechanisms in the apparatus and the sequence of their operation.

In order to prevent image blurring as a result of the great velocity of station movement the camera is supplied with a mechanism for compensating image shift. This mechanism at the time of exposure rotates the camera about the axis lying perpendicular to the flight direction. The rate of compensation, which is determined by the flight altitude, is set on the control panel.

Additional information is imprinted along the edges of each frame for the automatic processing of the photographs: clock reading, exposure, photometric wedge and frame sequence number.

The camera is pointed out a window, which with orbital orientation of the station is turned toward the earth. The window is covered by a blind which safeguards its glass against erosion and contamination. The blind is opened before a survey and is closed after a photographic session. In order for the window glass not to sweat, it is ventilated with warm air by means of a fan.

The basis for the MKF-6M camera was scientific investigations carried out at the Space Research Institute USSR Academy of Sciences and the long-term technological experience of the "Karl Zeiss Jena" enterprise in the field of optics. In particular, at the Space Research Institute USSR Academy of Sciences specialists formulated the basic recommendations on the conditions for carrying out multizonal photography of the earth from space. But the instrument itself was constructed in conformity to the technical specifications of the USSR Academy of Sciences and the Academy of Sciences German Democratic Republic at the national enterprise "Karl Zeiss Jena." Its specialists worked in close contact with specialists of the Space Research Institute USSR Academy of Sciences, Electronics Institute Academy of Sciences German Democratic Republic and a number of other organizations. Thus, in the specific example of creation of the new multizonal apparatus there is once again demonstration of the advantages of cooperation among the countries of the socialist economic bloc.

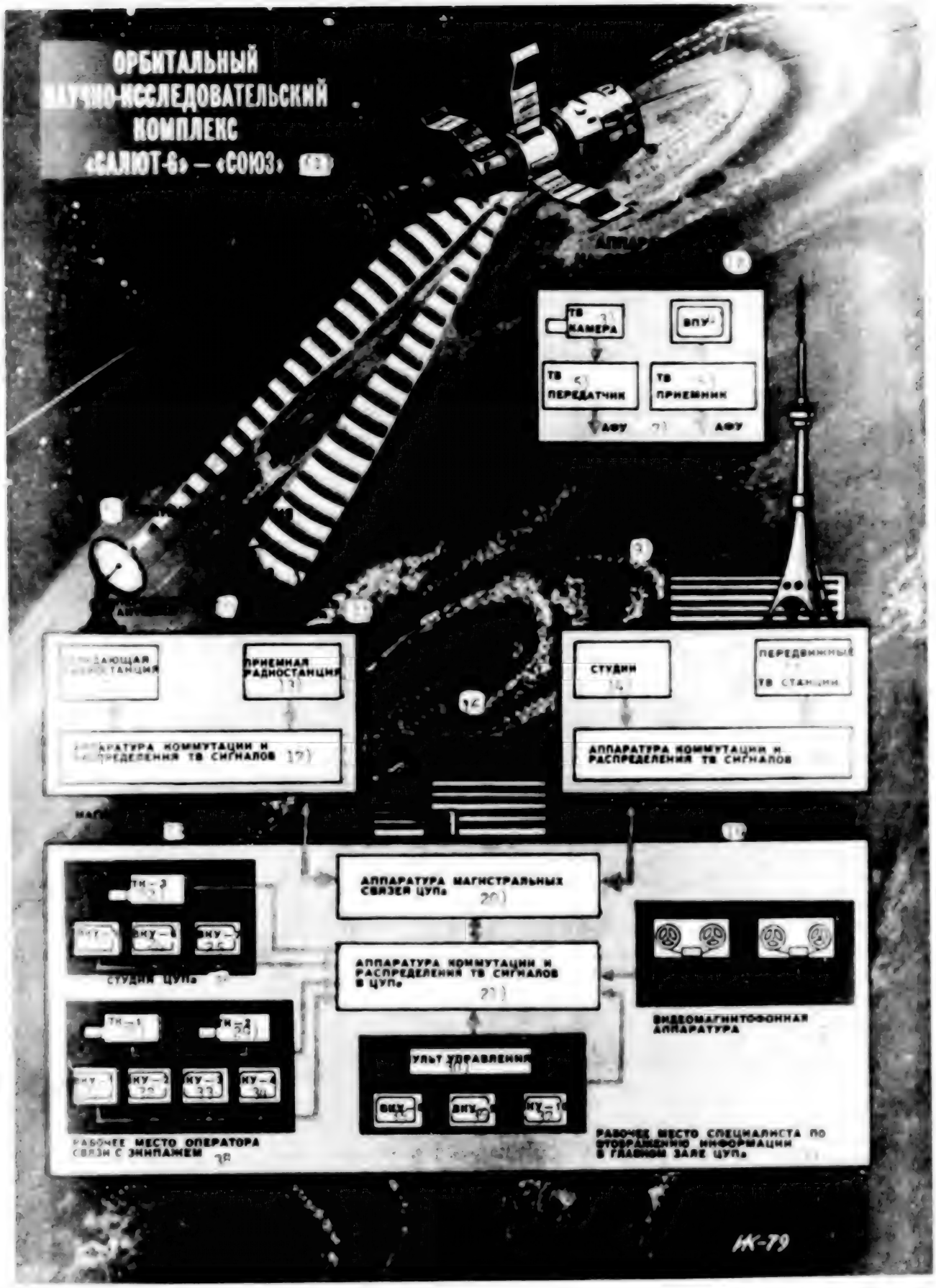
[8-5303]

DATA PUBLISHED ON SPACESHIP-EARTH TELEVISION LINK

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, 1979 pp 40-41

[Article by Candidate of Technical Sciences V. Konstantinov and Engineer V. Aleksandrov, "How Did the Wonder Happen?]

[Excerpts] Our latest orbital station, the "Salyut-6," was put into circumterrestrial orbit on 29 September 1977. Three main expeditions and three international organizations have worked aboard it. Using the "Progress" freighters there has been regular delivery to the station of fuel, scientific equipment and expendable materials. The complex, prolonged work program also dictated the creation of a videocommunication channel along the "earth-ship" line in addition to the existing "ship-earth" videocommunication channel. This is attributable both to the desire to increase the information capacity of the previously existing communication channel and a new approach to organization of the leisure of cosmonauts, since the preceding experience of prolonged flights has shown that the retention of a high performance of the cosmonauts over a long time to a considerable degree is dependent on the conditions aboard the station, the organization of the psychological support of the crew.


ОРБИТАЛЬНЫЙ НАУЧНО-ИССЛЕДОВАТЕЛЬСКИЙ КОМПЛЕКС «САЛЮТ-6» — «СОЮЗ»
ТВ КАМЕРА
ВПУ
ТВ ПЕРЕДАТЧИК
ТВ ПРИЕМНИК
АФУ
АФУ
ПРИЕМНАЯ РАДИОСТАНЦИЯ
АППАРАТУРА КОММУТАЦИИ И РАСПРЕДЕЛЕНИЯ ТВ СИГНАЛОВ
СТУДИИ
ПЕРЕДВИЖНЫЕ ТВ СТАНЦИИ
АППАРАТУРА КОММУТАЦИИ И РАСПРЕДЕЛЕНИЯ ТВ СИГНАЛОВ
АППАРАТУРА МАГИСТРАЛЬНЫХ СВЯЗЕЙ ЦУПа
АППАРАТУРА КОММУТАЦИИ И РАСПРЕДЕЛЕНИЯ ТВ СИГНАЛОВ В ЦУПе
ВИДЕОМАГНИТОФОННАЯ АППАРАТУРА
СТУДИЯ ЦУПа
ПУЛЬТ УПРАВЛЕНИЯ
РАБОЧЕЕ МЕСТО ОПЕРАТОРА СВЯЗИ С ЭКИПАЖЕМ
РАБОЧЕЕ МЕСТО СПЕЦИАЛИСТА ПО ОТОБРАЖЕНИЮ ИНФОРМАЦИИ В ГЛАВНОМ ЗАЛЕ ЦУПа
ИК-79

KEY TO FIGURE:

1. Orbital Scientific Research Complex "Salyut-6"-"Soyuz"
2. Instrumentation on orbital station
3. TV camera
4. Videoinspection unit
5. TV transmitter
6. TV receiver
7. Antenna-feeder line
8. Tracking station
9. Moscow TV Center
10. Transmitting antenna
11. Receiving antenna
12. Transmitting radio station
13. Receiving radio station
14. Studio
15. Mobile TV stations
16. Flight Control Center
17. Apparatus for commutation and distribution of TV signals
18. Apparatus for commutation and distribution of TV signals
19. Main communication line
20. Apparatus of main line communications for Flight Control Center
21. Apparatus for commutation and distribution of signals for Flight Control Center
22. Television camera 3
23, 24, 25. Videocontrol units 5, 6, 7
26. Studio at Flight Control Center
27. Videomagnetic recording apparatus
28, 29. Television cameras 1, 2
30. Control panel
31, 32, 33, 34. Videocontrol units 1, 2, 3, 4
35, 36, 37. Videocontrol units 8, 9, 10
38. Work place of operator for communication with crew
39. Work place of specialist on display of information in main hall of Flight Control Center

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Along the "earth-ship" television line it is possible to transmit images of drawings, diagrams, texts of service documents, display different units and instruments, and explain the method for carrying out different operations on shipboard. As a result there is an increase in the effectiveness of flight control, an increase in the results from communication sessions, and for the cosmonauts there is the effect of being present when working with the Control Center. In addition, the possibility for the cosmonauts to commune by television with their families and work comrades and to view entertaining, information and sports programs from Central Television both directly and recorded on film increase the level of psychological support and the cosmonauts do not develop a feeling of loneliness and isolation.

The creation of the new TV communication channel required the solution of a number of complex technical problems. The enterprises of Soviet industry developed new and perfected existing technical apparatus -- a highly sensitive wide-band on-board TV receiver, radio transmitting and receiving apparatus, and antenna systems at ground tracking stations. Specialists checked the electromagnetic compatability of standard and new on-board and ground radio facilities. At the Flight Control Center, for creating the new TV system, use was made of standard-produced Soviet TV apparatus and specially developed equipment -- commutators, distributors, control panels. (A functional diagram of the organization of the duplex "space-earth" TV communication line is reproduced here.)

Aboard the orbital complex there are two autonomous TV channels: transmitting and receiving. The first includes TV cameras and transmitters; the second includes a special TV receiver and a videoinspection unit. Each channel operates with its own antenna-feeder unit and has the necessary commutation and distribution equipment.

At the tracking stations there are transmitting and receiving antennas and also receiving-transmitting equipment and apparatus for the commutation and distribution of TV signals.

Standard television cameras are used as the on-board sources of TV information. In principle it is possible to use both black-and-white and color cameras. However, due to some technical limitations existing at the present time, in the organization of two-directional (duplex) videocommunication use is made of black-and-white cameras, whereas in one-directional (simplex) videocommunication along the line "ship-earth" use is made of color cameras.

The information can be fed from the Control Center by TV cameras installed on the panel of the main communications operator. One camera transmits an image of the face of the specialist conducting communication with the crew and a second transmits images of documents and different objects — equipment or instruments. A third TV camera, situated in the Control Center studio, is used for carrying on conversations with the crew by persons not directly participating in flight control (family members, flight directors, leading specialists). The videomagnetic recorders at the Center are intended for transmitting to the ship videorecordings of any subjects recorded in advance.

The studios and mobile TV stations of the Moscow Television Center are used as external sources of information. Using them it is possible to transmit entertaining and special programs for psychological support. For example, in May, by means of a mobile station of the Moscow Television Center there was direct videocommunication between relatives and friends of the cosmonauts and the "Salyut-6" station directly from the territory of Star City.

It is difficult to enumerate all the possibilities which space television affords. It will make it possible to establish communication with the cosmonauts directly from trainers, from scientific institutes, factories,

laboratories and medical institutes. Those who are beyond the limits of their native planet are becoming active participants in the social and political life of the country.

Television is one of the greatest wonders of our time. It is beginning to be of true service to people not only on the earth, but also in boundless space.

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